Clean version of how the Claims will read.
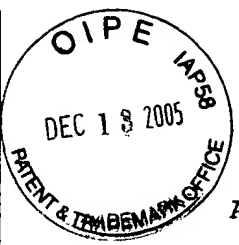
APPLICATION NO. 09/829,118

INVENTION: Multi-Resolution Waveforms

INVENTORS: Urbain Alfred von der Embse

CLAIMS

WHAT IS CLAIMED IS:

Claim **1**. (currently amended) A method for designing multi-resolution waveforms and filters, said method comprising:

means fpr generating complex Wavelet waveforms and filters,

means for including a frequency translation property specified by
a frequency translation parameter in addition to the
scale and translation parameters,

means for using a subset of the Fourier harmonics as the design
coordinates (harmonics) specifying the waveform design,

means for providing a single waveform design for all
waveforms at multiple scales, translations, and
frequencies, and

means for using the design harmonics and frequency translation
property to generate Wavelet waveforms at multiple scales
and multiple frequencies.

Claim **2**.(currently amended) The method of claim **1** further comprising:

means for combining filter design requirements with Wavelet
requirements to generate finite impulse response filters
(FIR) and waveforms,

means for including frequency and time error metrics and for
including application constraints in the weighted least-
squares sum J of the error metrics,

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means for finding the FIR design harmonics that minimize the
    constrained sum J of the error metrics,
means for implementing direct least-squares error techniques to
    find the design harmonics that minimize J,
means for implementing iterative eigenvalue error techniques to
    find the design harmonics that minimize J, and
means for using the plurality of design methodologies in the
    time-frequency space to find the design harmonics.

Claim **3**. (currently amended) The methods of claim **1** and claim **2**
further comprising:
means for designing polyphase orthogonal filter banks with
    almost perfect reconstruction properties,
means for designing polyphase quadrature mirror filter
    (QMF) orthogonal filter banks,
means for designing waveforms and filters with no excess
    bandwidth, and
means for designing almost ideal waveforms and filters for linear
    and non-linear applications.

Claim **4**. (currently amended) The methods of claim **1**, claim **2**,
and claim **3** further comprising:
means for including analytical, iterated filter bank, and
    scaling function design techniques for tiling (covering),
means for tiling the time-frequency space for
    communications and radar,
means for tiling the spatial-frequency space for media
    processing,
means for tiling the time-frequency-beam space for cellular and
    satellite communications and radar, and
means for tiling the time-wavelength space for laser and optical
    communications, targeting, and ranging.

Claim **5**. (currently amended) A method for the design of multi-resolution waveforms and filters, said method comprising:

means for generating complex waveforms with frequency
translation, scaling, and time translation properties,

means for providing a single waveform design for all waveforms
at multiple scales, translations, and frequencies,

means for using a subset of Fourier harmonics as the design
coordinates specifying the waveform design,

means for using the design harmonics and the frequency
translation property to generate waveforms at multiple
scales and multiple frequencies, and

means for using the plurality of optimum design techniques to
derive the design harmonics.

Claim **6**. (currently amended) The methods of claim **5** further comprising:

means for designing the multi-resolution waveforms for bandwidth
efficient modulation (BEM),

means for designing the multi-resolution waveforms for high power
amplifiers and non-linear signal processing,

means for designing the waveforms for non-linear applications,

means for designing the waveforms for multi-resolution and
bandwidth-on-demand communications,

means for designing the multi-resolution waveforms for synthetic
and real aperture radar applications, and

means for designing the multi-resolution waveforms for laser
radar and laser communications.